A paper was then read, entitled, "Remarks on certain Statements of Mr. Faraday, contained in the Fourth and Fifth Series of his Experimental Researches in Electricity." By John Davy, M.D., F.R.S.

Dr. Davy complains that Mr. Faraday has, in the paper referred to, made certain statements with respect to the opinions of Sir Humphry Davy relative to the conducting powers of dry nitre, and caustic potash and soda, when in fusion by heat, and also with regard to other matters connected with voltaic electricity, which are not correct; and vindicates Sir Humphry Davy from the charge of want of perspicuity in the statement of his views of these subjects.

A Note by Mr. Faraday on the preceding Remarks by Dr. Davy was then read, in which he replies to the charges there brought forward, and justifies those statements, the accuracy of which had been impugned by Dr. Davy.

January 29, 1835.

WILLIAM THOMAS BRANDE, Esq., V.P. in the Chair.

The reading of a paper was commenced, entitled, "Experimental Researches in Electricity. Ninth Series." By Michael Faraday, Esq., D.C.L., F.R.S.

February 5, 1835.

The Rev. PHILIP JENNINGS, D.D., Vice-President, in the Chair.

Albert William Beetham, Esq.; John Edye, Esq.; John Hamett, M.D.; John Greathed Harris, Esq.; the Rev. Henry Tattam, M.A.; and Martin Tupper, Esq.; were elected Fellows of the Society.

Mr. Faraday's paper, entitled, "Experimental Researches in Electricity. Ninth Series," was resumed and concluded.

In the series of experiments which are detailed in this paper, the author inquires into the causes of some remarkable phænomena relating to the action of an electric current upon itself, under certain circumstances, whereby its intensity is highly exalted, and occasionally increased to ten, twenty, or even fifty times that which it originally possessed. For the production of this effect, the principal condition is that the current traverse a considerable length of a good conductor, such as a long wire; more especially if this wire be coiled in the form of a helix; and the effect is still farther augmented when this helix is coiled round a cylinder of soft iron, constituting an electro-magnet. The evidence on which these conclusions are founded is the following. If an electromotor, consisting of a single pair of zinc and copper plates, have these metals connected by a short wire dipping into cups of mercury, the electric spark consequent upon either forming or breaking the circuit is so slight as to be scarcely perceptible; but if a long wire be employed as the medium of connexion, a bright spark is obtained on breaking the contact. If the wire be coiled in a helix,

the spark is still brighter; and if a core of soft iron be placed within the helix, the spark, at the moment of disjunction, is more brilliant than in any of the former cases: and the higher intensity of the current is also manifested by the occurrence of a shock, at the same moment, to a person who grasps with wetted hands the two ends of the wire; whereas no such effect, nor even any sensible impression on the tongue, is produced by the electromotor, when a short wire is employed.

All these effects of exaltation are produced at a time when the actual current of electricity from the electromotor is greatly diminished; as the author shows by many experiments on the ignition of a fine wire, and the deflection of a galvanometer. He also proves that the effects of the spark and the shock, at the moment of disjunction of a long wire, are due to a current far more powerful than that which passes through the short wire at the same instant; or indeed than that which passes through either the long or the short wire at any other instant of time than when the disjunction takes place.

That this extraordinary effect is not due to any species of inertia, is shown by the fact, that the same wire will produce it in a greater or less degree, under circumstances incapable of influencing any effect depending on inertia: thus, if 100 feet of wire, when extended, produce a certain effect, a greater effect will be produced by coiling the same wire into a helix, and a still more powerful one by employing it as the helix of an electro-magnet.

The author ultimately refers these phænomena to an inductive action of the current, analogous, or perhaps identical, with that described in the First Series of these Experimental Researches: for he found that when a second wire was placed parallel to the long conducting wire, the ends of this second wire being connected together so that a current of electricity could circulate round it, then the spark and shock did not take place at the first wire at the moment of disjunction, but a current was induced at the second wire, according to the law originally described in the First Series. The moment the current in the second wire was interrupted, the spark and shock appeared at the first. These and many other experiments were adduced to prove that these effects, namely, the shock and the spark, result from an inductive action of the original current, producing, at the moment it is stopped, a current, in the same direction as itself, in the same wire which serves to convey the original current.

The author, lastly, considers the reverse effect produced upon making contact; and concludes his paper by some general views of the consequences resulting from this inductive action in various cases of electric discharge; pointing out the important influence it must have in magneto-electrical machines of the ordinary construction.

The reading of a paper was then commenced, entitled, "Geometrical Researches concerning Terrestrial Magnetism." By Thomas Stephens Davies, Esq., F.R.S., &c.